1. An illumination optical apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substatially linearly arranged in at least one line, based on the beam from said light supply means;

an optical integrator having a plurality of lens elements for forming a plurality of light source images, based on the beam from said light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length. said lens elements having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side thereof; and

a first relay optical system disposed between said light-source-image forming means and said optical integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said optical integrator

said light supply means including;

a light source system for emitting light having a beam cross section of substantially square or circle;

light source changing means for forming a plurality of light source images, based on the light from said light source system; and

a second relay optical system located between said light source changing means and said light-source-image forming means, for making a position of the light source images formed by said light source changing means conjugate with a position of the light source images formed by said light-source-image forming means.

2. An illumination optical apparatus according to claim 1, wherein said light-source-image forming means is an optical integrator having a plurality of lens elements arranged in at least one line, said lens elements having a same refracting power both in the direction in which said lens elements arranged and in the direction perpendicular to the direction in which said lens element arranged.

3. An illumination optical apparatus according to claim 1, wherein the ratio of height to width of said optical integrator of said light-source-image forming means along a plane perpendicular to an optical axis of said apparatus is the same as the ratio of longitudinal and transverse length of each lens element of said optical integrator for forming light source images based on beam from said light-source-image forming means.

4. A method of fabricating a semiconductor device using an illumination optical apparatus according to claim 3, said method comprising the steps of:

guiding a light from said illumination apparatus to a mask on which a predetermined circuit pattern is formed and illuminating the pattern; and

with moving said mask and photo-sensitive substrate in predetermined directions respectively, projecting said pattern of the mask on the sensitive substrate.

5. An illumination optical apparatus according to claim 1, wherein said light source changing means is provided with a plurality of lens elements having a rectangular cross section.

6. An illumination optical apparatus according to claim 1, wherein said light source changing means is an internal reflection type integrator.

7. A method of fabricating a semiconductor device using an illumination optical apparatus according to claim 1, said method comprising the steps of:

guiding a light from said illumination apparatus to a mask on which a predetermined circuit pattern is formed and illuminating the pattern; and

with moving said mask and photo-sensitive substrate in predetermined directions respectively, projecting said pattern of the mask on the sensitive substrate.

8. An illumination optical apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substatially linearly arranged in at least one line, based on the beam from said light supply means;

an internal reflection type integrator having two reflection planes parallel to each other for forming a plurality of light source images, based on the beam from said light-source-image forming means, said internal reflection type integrator having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length; and

a first relay optical system disposed between said light-source-image forming means and said internal reflection type integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said internal reflection type integrator,

said light supply means including;

a light source system for emitting light having a beam cross section of substantially square or circle;

light source changing means for forming a plurality of light source images, based on the light from said light source system; and

a second relay optical system located between said light source changing means and said light-source-image forming means, for making a position of the light source images formed by said light source changing means conjugate with a position of the light source images formed by said light-source-image forming means.

9. An illumination optical apparatus according to claim 8, wherein said light source changing means is provided with a plurality of lens elements having a rectangular cross section.

10. An illumination optical apparatus according to claim 8, wherein said light source changing means is an internal reflection type integrator.

11. A method of fabricating a semiconductor device using an illumination optical apparatus according to claim 8, said method comprising the steps of:

guiding a light from said illumination apparatus to a mask on which a predetermined circuit pattern is formed and illuminating the patter; and

with moving said mask and photo-sensitive substrate in predetermined directions respectively, projecting said pattern of the mask on the sensitive substrate.

12. An illumination optical apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substatially linearly arranged in at least one line, based on the beam from said light supply means;

an optical integrator having a plurality of lens elements for forming a plurality of light source images, based on the beam from said light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length, said lens elements having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side thereof; and

a relay optical system disposed between said light-source-image forming means and said optical integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said optical integrator,

said light supply means comprising:

a collector mirror having an ellipsoidal surface of revolution;

a light source located at one focal point of said ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by said collector mirror; and

a collimator lens for converting light collected by said collector mirror into substantially parallel beams.

13. An illumination optical apparatus comprising;

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substatially linearly arranged in at least one line, based on the beam from said light supply means;

an internal reflection type integrator having two reflection planes parallel to each other for forming a plurality of light source images, based on the beam from said light-source-image forming means. said internal reflecotion type integrator having a rectangular cross section,

two sides adjacent to each other of said rectangular cross section being different in length; and

a relay optical system disposed between said light-source-image forming means and said internal reflection type integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said internal reflection type integrator,wherein said light supply means comprising:

a collector mirror having an ellipsoidal surface of revolution;

a light source located at one focal point of said ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by said collector mirror; and

a collimator lens for converting light collected by said collector mirror into substantially parallel beams.

14. An illumination optical apparatus comprising;

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substatially linealy arranged in at least one line, based on the beam from said light supply means;

an optical integrator having a plurality of lens elements for forming a plurality of light source images, based on the beam from said light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length, said lens elements having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side thereof; and

a relay optical system disposed between said light-source-image forming means and said optical integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said optical integrator.

said light supply means comprising:

a collector mirror having an ellipsoidal surface of revolution; and

a light source located at a first focal point of said ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by said collector mirror.

15. An illumination optical apparatus comprising;

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substantially linealy arranged in at least one line, based on the beam from said light supply means;

an internal reflection type integrator having two reflection planes parallel to each other for forming a plurality of light source images, based on the beam from said light-source-image forming means, said internal reflection type integrator having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length; and

a relay optical system disposed between said light-source-image forming means and said internal reflection type integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said internal reflection type integrator.

said light supply means comprising:

a collector mirror having an ellipsoidal surface of revolution; and

a light source located at a first focal point of said ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by said collector mirror.

16. A scanning exposure apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substatially linerly arranged in at least one line, based on the beam from said light supply means;

an optical integrator having a plurality of lens elements for forming a plurality of light source images, based on the beam from said light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length, said lens elements having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side thereof;

a first relay optical system disposed between said light-source-image forming means and said optical integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said optical integrator;

a condenser optical system for condensing the beam from said optical integrator to illuminate a surface of a reticle;

a reticle stage for moving said reticle in a direction parallel to said surface of reticle;

a wafer stage for carrying a wafer on which integrated circuits are to be formed, and moving said wafer in a direction parallel to a surface of said wafer; and

a projection optical system disposed between said reticle and said wafer, for making a position at which said reticle is located conjugate with a position at which said wafer is located,

said light supply means including;

a light source system for emitting light having a beam cross section of substantially square or circle;

light source changing means for forming a plurality of light source images, based on the light from said light source system; and

a second relay optical system located between said light source changing means and said light-source-image forming means, for making a position of the light source images formed by said light source changing means conjugate with a position of the light source images formed by said light-source-image forming means.

17. A scanning exposure apparatus according to claim 16, wherein said reticle stage moves said reticle in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular configuration of each lens element of said optical integrator, and said wafer stage moves said wafer in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular sectional configuration of each lens element of said optical integrator.

18. A method of fabricating a semiconductor device using a scanning exposure apparatus according to claim 17, said method comprising the steps of:

guiding a light from said condenser optical system to a said reticle and illuminating said reticle; and

with moving said reticle stage and said wafer stage in predetermined directions respectively, projecting a pattern of said reticle on said wafer to perform the exposure.

19. A scanning exposure apparatus according to claim 16, wherein said light-source-image forming means comprises an optical integrator having a plurality of lens elements arranged in at least one line.

20. A scanning exposure apparatus according to claim 19, wherein the ratio of height to width of said optical integrator of said light-source-image forming means along a plane perpendicular to an optical axis of said optical integrator is proportional to the ratio of longitudinal and transverse length of each lens element of said optical integrator for forming light source images based on the beam from said light-source-image forming means.

21. A scanning exposure apparatus according to claim 20, wherein said reticle stage moves said reticle in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular configuration of each lens element of said optical integrator, and said wafer stage moves said wafer in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular sectional configuration of each lens element of said optical integrator.

22. A method of fabricating a semiconductor device using a scanning exposure apparatus according to claim 20, said method comprising the steps of:

guiding a light from said condenser optical system to a said reticle and illuminating said reticle; and

with moving said reticle stage and said wafer stage in predetermined directions respectively, projecting a pattern of said reticle on said wafer to perform the exposure.

23. A scanning exposure apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images which are substatially and linearly arranged in at least one line, based on the beam from said light supply means;

an internal reflection type integrator having two reflection planes parallel to each other for forming a plurality of light source images, based on the beam from said light-source-image forming means, said internal reflection type integrator having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length;

a relay optical system disposed between said light-source-image forming means and said internal reflection type integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said internal reflection type integrator;

a condenser optical system for condensing the beam from said internal reflection type integrator to illuminate a surface of a reticle;

a reticle stage for moving said reticle in a direction parallel to said surface of reticle;

a wafer stage for carrying a wafer on which integrated circuits are to be formed, and moving said wafer in a direction parallel to a surface of said wafer; and

a projection optical system disposed between said reticle and said wafer, for making a position at which said

reticle is located conjugate with a position at which said wafer is located,

said light supply means including;

a light source system for emitting light having a beam cross section of substantially square or circle;

light source changing means for forming a plurality of light source images, based on the light from said light source system; and

a second relay optical system located between said light source changing means and said light-source-image forming means, for making a position of the light source images formed by said light source changing means conjugate with a position of the light source images formed by said light-source-image forming means.

24. An illumination optical apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images in a substantially linear arrangement, based on the beam from said light supply means;

an optical integrator having a plurality of lens elements for forming a plurality of light source images, based on the beam from said light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length, said lens elements having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side thereof; and

a relay optical system disposed between said light-source-image forming means and said optical integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said optical integrator.

25. An illumination optical apparatus according to claim 24, wherein said light-source-image forming means is an optical integrator having a plurality of lens elements arranged in at least one line, said lens elements having a same refracting power both in the direction in which said lens elements arranged and in the direction perpendicular to the direction in which said lens elements arranged.

26. An illumination optical apparatus according to claim 25, wherein the ratio of height to width of said optical integrator of said light-source-image forming means along a plane perpendicular to an optical axis of said apparatus is the same as the ratio of longitudinal and transverse length of each lens element of said optical integrator for forming light source images based on the beam from said light-source-image forming means.

27. An illumination optical apparatus according to claim 24. further comprising: a conversion member for converting plural light-source-images formed by said optical integrator into a light-source-image having a ring shape or a light-source-image of which center is shifted from an optical axis of optical system of said illumination optical apparatus.

28. A method of fabricating a semiconductor device using an illumination optical apparatus according to claim 24, said method comprising the steps of:

guiding a light from said illumination apparatus to a mask on which a predetermined circuit pattern is formed and illuminating the pattern; and

with moving said mask and photo-sensitive substrate in predetermined directions respectively, projecting said pattern of the mask on the sensitive substrate.

29. An illumination optical apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images in a substantially linear arrangement, based on the beam from said light supply means;

an internal reflection type integrator having two reflection planes parallel to each other for forming a plurality of light source images, based on the beam from said light-source-image forming means, said internal reflection type integrator having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length; and

a relay optical system disposed between said light-source-image forming means and said internal reflection type integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said internal reflection type integrator.

30. An illumination optical apparatus according to claim 29, wherein said light-source-image forming means is an optical integrator having a plurality of lens elements arranged in at least one line, said lens elements having a same refracting power both in the direction in which said lens elements arranged and in the direction perpendicular to the direction in which said lens elements arranged.

31. An illumination optical apparatus according to claim 29, further comprising: a conversion member for converting plural light-source-images formed by said optical integrator into a light-source-image having a ring shape or a light-source-image of which center is shifted from an optical axis of optical system of said illumination optical apparatus.

32. A method of fabricating a semiconductor device using an illumination optical apparatus according to claim 29, said method comprising the steps of:

guiding a light from said illumination apparatus to a mask on which a predetermined circuit pattern is formed and illuminating the pattern; and

with moving said mask and photo-sensitive substrate in predetermined directions respectively, projecting said pattern of the mask on the sensitive substrate.

33. A scanning exposure apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images in a substantially linear arrangement, based on the beam from said light supply means;

an optical integrator having a plurality of lens elements for forming a plurality of light source images, based on the beam from said light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length, said lens elements having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side thereof;

a relay optical system disposed between said light-source-image forming means and said optical integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said optical integrator;

a condenser optical system for condensing the beam from said optical integrator to illuminate a surface of a reticle;

a reticle stage for moving said reticle in a direction parallel to said surface of reticle;

a wafer stage for carrying a wafer on which integrated circuits are to be formed, and moving said wafer in a direction parallel to a surface of said wafer; and

a projection optical system disposed between said reticle and said wafer, for making a position at which said reticle is located conjugate with a position at which said wafer is located.

34. A scanning exposure apparatus according to claim 33, wherein said reticle stage moves said reticle in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular configuration of each lens element of said optical integrator, and said wafer stage moves said wafer in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular sectional configuration of each lens element of said optical integrator.

35. A scanning exposure apparatus according to claim 33, wherein said light-source-image forming means comprises an optical integrator having a plurality of lens elements arranged in at least one line.

36. A scanning exposure apparatus according to claim 35, wherein the ratio of height to width of said optical integrator of said light-source-image forming means along a plane perpendicular to an optical axis of said optical integrator is proportional to the ratio of longitudinal and transverse length of each lens element of said optical integrator for forming light source images based on the beam from said light-source-image forming means.

37. A scanning exposure apparatus according to claim 36, wherein said reticle stage moves said reticle in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular configuration of each lens element of said optical integrator, and said wafer stage moves said wafer in a direction perpendicular to an optical axis of said apparatus and along a short side of a rectangular sectional configuration of each lens element of said optical integrator.

38. A method of fabricating a semiconductor device using a scanning exposure apparatus according to claim 37, said method comprising the steps of:

guiding a light from said condenser optical system to said reticle to illuminate said reticle; and

with moving said reticle and said wafer stage in predetermined directions respectively, projecting a pattern of the reticle on said wafer to perform the exposure.

39. An illumination optical apparatus according to claim 33, further comprising: a conversion member for converting plural light-source-images formed by said optical integrator into a light-source-image having a ring shape or a light-

source-image of which center is shifted from an optical axis of optical system of said illumination optical apparatus.

40. A method of fabricating a semiconductor device using a scanning exposure apparatus according to claim **33**, said method comprising the steps of:

guiding a light from said condenser optical system to said reticle to illuminate said reticle; and

with moving said reticle stage and said wafer stage in predetermined directions respectively, projecting a pattern of said reticle on said wafer to perform the exposure.

41. A scanning exposure apparatus comprising:

a light supply means for supplying a beam;

a light-source-image forming means for forming a plurality of light source images in a substantially linear arrangement, based on the beam from said light supply means;

an internal reflection type integrator having two reflection planes parallel to each other for forming a plurality of light source images, based on the beam from said light-source-image forming means, said internal reflection type integrator having a rectangular cross section, two sides adjacent to each other of said rectangular cross section being different in length;

a relay optical system disposed between said light-source-image forming means and said internal reflection type integrator, for making a position of the light source images formed by said light-source-image forming means conjugate with a position of the light source images formed by said internal reflection type integrator;

a condenser optical system for condensing the beam from said internal reflection type integrator to illuminate a surface of a reticle

a reticle stage for moving said reticle in a direction parallel to said surface of reticle;

a wafer stage for carrying a wafer on which integrated circuits are to be formed, and moving said wafer in a direction parallel to a surface of said wafer; and

a projection optical system disposed between said reticle and said wafer, for making a position at which said reticle is located conjugate with a position at which said wafer is located.

42. An illumination optical apparatus according to claim 41, further comprising: a conversion member for converting plural light-source-images formed by said optical integrator into a light-source-image having a ring shape or a light-source-image of which center is shifted from an optical axis of optical system of said illumination optical apparatus.

43. (Amended) A scanning exposure apparatus comprising,

an illumination optical system, an optical axis of said illumination optical system being substantially perpendicular to a rectangular area on a predetermined plane on which a mask is arranged, said illumination optical system comprising an internal reflection type integrator with an exit plane having a shape substantially equal to that of said rectangular area on said predetermined plane, and said illumination optical system illuminating said rectangular area with an illumination beam, and

a movable member arranged to relatively move said mask with respect to said slit area on said predetermined plane during scanning of said illumination beam on a substrate through said mask, and to hold said mask at a position on or near said predetermined plane.

44. An apparatus according to claim 43, further comprising a stop member arranged between said internal reflection type integrator and said predetermined plane and arranged to limit said illumination beam in said illumination optical system.

45. An apparatus according to claim 44, wherein said stop member is substantially arranged on a pupil plane of said illumination optical system.

46. An apparatus according to claim 44, wherein said internal reflection type integrator is arranged so that said exit plane substantially conjugates with a surface of said mask.

47. An apparatus according to claim 46, further comprising:

a projection optical system arranged between said predetermined plane and said substrate, a plurality of light source images formed by said internal reflection type integrator being substantially formed on a pupil plane of said projection optical system.

48. An apparatus according to claim 47, further comprising:

another movable member arranged in a position on or near an imaging plane of said projection optical system and movable independently of said movable member, said another movable member holding said substrate.

49. An apparatus according to claim 43, further comprising an optical device arranged on said optical axis in said illumination optical system, said optical device changing an intensity distribution of said illumination beam on a pupil plane of said illumination optical system.

50. An apparatus according to claim 49, wherein said optical device selectively forms a first intensity distribution having a decreased intensity portion on said optical axis, the intensity of which is lower than an intensity of a portion located outer thereof on said optical axis, and a second intensity distribution having an increased intensity portion on said optical axis, the intensity of which is higher than an intensity of a portion located outer thereof on said optical axis.

51. An apparatus according to claim 43, further comprising:

an optical integrator arranged at a position beyond an incident plane of said internal reflection type integrator; and

a relay optical system arranged between said internal reflection type integrator and said optical integrator.

52. An apparatus according to claim 51, wherein said optical integrator has a cross sectional shape different from that of said internal reflection type integrator.

53. An apparatus according to claim 43, wherein said internal reflection type integrator comprises a glass rod.

54. (Twice Amended) A scanning exposure apparatus comprising:

an illumination optical system arranged to illuminate a slit area on a predetermined plane on which a mask is arranged, with an illumination beam, an optical axis of said illumination optical system being substantially perpendicular to said slit area, and said illumination optical system comprising a fly-eye type integrator having a plurality of optical elements each of which has a cross sectional shape that is substantially equal to said slit area on said predetermined plane and an optical device which changes an intensity distribution of said illumination beam on a pupil plane of said illumination optical system; and

a movable member arranged to relatively move said mask with respect to said slit area on said predetermined plane during scanning exposure on a substrate with said illumination beam through said mask, and to hold said mask at a position on or near said predetermined plane.

55. An apparatus according to claim 54, wherein said slit area has a substantially rectangular shape and said movable member moves in a direction substantially perpendicular to a longitudinal direction of said slit area.

56. (Amended) An apparatus according to claim 55, wherein said optical device comprises a stop member arranged between said fly-eye type integrator and said predetermined plane and arranged to limit said illumination beam in said illumination optical system.

57. (Amended) An apparatus according to claim 56, wherein said stop member is substantially arranged on said pupil plane of said illumination optical system.

58. (Amended) An apparatus according to claim 57, wherein said stop member comprises a plurality of aperture stops having shapes that are different among them, and said intensity distribution of said illumination beam on said pupil plane is changeable.

59. (Amended) An apparatus according to claim 58, wherein said fly-eye type integrator is arranged so that an incident plane of said fly-eye type integrator substantially conjugates with a surface of said mask and one of said aperture stops is arranged adjacent to an exit plane of said fly-eye type integrator.

60. (Amended) An apparatus according to claim 59, further comprising:

an projection optical system arranged between said predetermined plane and said substrate, a pupil plane of said projection optical system substantially conjugating with said exit plane of said fly-eye type integrator.

61. An apparatus according to claim 60, further comprising:

another movable member arranged in a position on or near an imaging plane of said projection optical system, and movable independently of said movable member, said another movable member holding said substrate.

62. An apparatus according to claim 61, further comprising:

an optical integrator arranged at a position beyond said incident plane of said fly-eye type integrator; and

a relay optical system arranged between said fly-eye type integrator and said optical integrator.

63. An apparatus according to claim 62, wherein said optical integrator has an external form substantially equal to a cross section shape of said fly-eye type integrator.

64. (Amended) A scanning exposure apparatus comprising:

an illumination optical system arranged to illuminate a slit area on a predetermined plane on which a mask is arranged, with an illumination beam, an optical axis of said illumination optical system being substantially perpendicular to said slit area on said predetermined plane, and said illumination optical system comprising an optical integrator arranged on said optical axis, which forms a plurality of light source images in which the number of light source images arranged in a first direction corresponding to a longitudinal direction of said slit area is different from a number of light source images arranged in a second direction crossing said first direction; and

a movable member arranged to relatively move said mask with respect to said slit area on said predetermined plane during scanning of said illumination beam on a substrate through said mask, and to hold said mask at a position on or near said predetermined plane

65. An apparatus according to claim 64, wherein said slit area has a substantially rectangular shape and said movable member moves in a direction substantially perpendicular to a longitudinal direction of said slit area.

66. An apparatus according to claim 65, wherein said optical integrator comprises fly-eye type integrators each of which has a plurality of optical elements having a cross sectional shape that is substantially equal to said slit area.

67. An apparatus according to claim 66, further comprising:

a projection optical system arranged between said predetermined plane and said substrate, said plurality of light source images being substantially formed on a pupil plane of said projection optical system.

68. An apparatus according to claim 67, further comprising:

another movable member arranged at a position on or near an imaging plane of said projection optical system, and movable independently of said movable member, said another movable member holding said substrate.

69. An apparatus according to claim 64, further comprising:

a second optical integrator arranged at a position beyond an incident plane of said optical integrator; and

a relay optical system arranged between said optical integrator and said second optical integrator.

70. An apparatus according to claim 69, wherein said second optical integrator has an external form different from an external form of said optical integrator.

71. An apparatus according to claim 70, wherein said optical integrator and said second optical integrator are fly-eye type integrators each of which has a plurality of optical elements, and each of said optical elements of said second optical integrator has a cross sectional shape different from a cross sectional shape of said optical integrator.

72. An apparatus according to claim 71, wherein each of said optical elements of said optical integrator has a cross sectional shape substantially equal to said slit area and said second optical integrator has an external form substantially equal to the cross sectional shape of each of said optical elements of said optical integrator.

73. An apparatus according to claim 69, further comprising:

a third optical integrator arranged at a position beyond an incident plane of said optical integrator; and

a second relay optical system arranged between said second and third optical integrators.

74. An apparatus according to claim 64, further comprising:

an optical device arranged on said optical axis in said illumination optical system, said optical device changing the intensity distribution of said illumination beam on a pupil plane of said illumination optical system.

75. An apparatus according to claim 74, wherein said optical device forms an intensity distribution having a decreased intensity portion on said optical axis, the intensity of which is lower than an intensity of a portion located outer thereof on said optical axis.

76. (Amended) A scanning exposure method comprising the steps of:

illuminating a rectangular area on a predetermined plane on which a mask is arranged with an illumination beam emerging from an internal reflection type integrator, an exit plane of said internal reflection type integrator having a shape substantially equal to a shape of said rectangular area on said predetermined plane; and

relatively moving said mask and a substrate with respect to said illumination beam, respectively, to perform scanning exposure of said substrate with said illumination beam through said mask.

77. (Twice Amended) A device manufacturing method comprising a step of transferring a device pattern onto a work piece, wherein said transferring step comprises:

illuminating a rectangular area on a predetermined plane on which a mask is arranged with an illumination beam emerging from an internal reflection type integrator, an exit plane of said internal reflection type integrator having a shape substantially equal to a shape of said rectangular area on said predetermined plane; and

relatively moving said mask and said work piece with respect to said illumination beam, respectively, to perform scanning exposure of said work piece with said illumination beam through said mask.

78. (Twice Amended) A scanning exposure method comprising the steps of:

illuminating a slit area on a predetermined plane on which a mask is arranged with an illumination beam emerging from a fly-eye type integrator having a plurality of optical elements each of which has a cross sectional shape substantially equal to a shape of said slit area on said predetermined plane;

changing an intensity distribution of said illumination beam on a pupil plane of an illumination optical system that includes said fly-eye type integrator; and

relatively moving said mask and a substrate with respect to said illumination beam, respectively, to perform scanning exposure of said substrate with said illumination beam through said mask.

79. A method according to claim 78, wherein said slit area has a substantially rectangular shape and said mask is moved in a direction substantially perpendicular to the longitudinal direction of said slit area during said scanning exposure.

80. (Three Times Amended) A device manufacturing method comprising a step of transferring a device pattern onto a work piece, wherein said transferring step comprises:

illuminating a slit area on a predetermined plane on which a mask is arranged with an illumination beam emerging from a fly-eye type integrator having a plurality of optical elements each of which has a cross sectional shape substantially equal to a shape of said slit area on said predetermined plane;

changing an intensity distribution of said illumination beam on a pupil plane of an illumination optical system that includes said fly-eye type integrator; and

relatively moving said mask and said work piece with respect to said illumination beam, respectively, to perform scanning exposure of said work piece with said illumination beam through said mask.

81. A scanning exposure method comprising the steps of:

illuminating a slit area on a predetermined plane on which a mask is arranged with an illumination beam emerging from an optical integrator, said optical integrator forming a plurality of light source images, in which the number of light source images arranged in a first direction corresponding to a longitudinal direction of said slit area is different from a number of light source images arranged in a second direction crossing said first direction; and

relatively moving said mask and a substrate with respect to said illumination beam, respectively, to perform scanning exposure of said substrate with said illumination beam through said mask.

82. A method according to claim 81, wherein said slit area has a substantially rectangular shape and said mask is moved in a direction substantially perpendicular to the longitudinal direction of said slit area during said scanning exposure.

83. (Amended) A device manufacturing method comprising a step of transferring a device pattern onto a work piece, wherein said transferring step comprises:

illuminating a slit area on a predetermined plane on which a mask is arranged with an illumination beam emerging from an optical integrator, said optical integrator forming a plurality of light source images, in which the number of light source images arranged in a first direction corresponding to a longitudinal direction of said slit area is different from a number of light source images arranged in a second direction crossing said first direction; and

relatively moving said mask and said work piece with respect to said illumination beam, respectively, to perform scanning exposure of said work piece with said illumination beam through said mask.

84. (Amended) A scanning exposure apparatus comprising:

an illumination optical system, an optical axis of said illumination optical system being substantially perpendicular to a slit area on a predetermined plane, said illumination optical system comprising an internal reflection type integrator on said optical axis and an optical device which changes an intensity distribution of an illumination beam on a pupil plane of said illumination optical system, and said illumination optical system illuminating said slit area with said illumination beam; and

a movable member arranged to relatively move a mask with respect to said slit area during scanning exposure on a substrate with said illumination beam through said mask, and hold said mask at a position on or near said predetermined plane.

85. (Amended) An apparatus according to claim 84, wherein said optical device forms different intensity distributions of said illumination beam on said pupil plane of said illumination optical system.

86. An apparatus according to claim 85, wherein said optical device selectively forms a first intensity distribution having a decreased intensity portion on said optical axis, the intensity of which is lower than an intensity of a portion located outer thereof on said optical axis, and a second intensity distribution having an increased intensity portion on said optical axis, the intensity of which is higher than an intensity of a portion located outer thereof on said optical axis.

87. An apparatus according to claim 84, wherein the pupil plane has a center area and an outer area around the center area, and said optical device makes an intensity distribution increase in the outer area, in comparison with the intensity distribution in the center area of said pupil plane.

88. An apparatus according to claim 84, wherein said optical device makes an intensity distribution increase in a plurality of areas which are eccentric to said optical axis.

89. An apparatus according to claim 84, further comprising:

another optical integrator different from said internal reflection type integrator, said another optical integrator arranged within said illumination optical system.

90. An apparatus according to claim 89, wherein said another optical integrator comprises one of an internal reflection type integrator and a fly-eye type integrator.

91. An apparatus according to claim 84, further comprising:

a projection optical system having a pupil plane which substantially conjugates with an incident plane of said internal reflection type integrator.

92 An apparatus according to claim 91, further comprising:

another movable member arranged in a position on or near an imaging plane of said projection optical system and movable independently relative to said movable member, said another movable member holding said substrate.

93. A scanning exposure apparatus comprising:

an illumination optical system, an optical axis of said illumination optical system being substantially perpendicular to a slit area on a predetermined plane, said illumination optical system having a pupil plane including a center area and an outer area around the center area, said illumination optical system comprising a first optical integrator on said optical axis and an optical device which makes an intensity distribution increase in

the outer area, in comparison with an intensity distribution in the center area of said pupil plane, and said illumination optical system illuminating said slit area with an illumination beam; and

a moveable member arranged to relatively move a mask with respect to said slit area during scanning exposure on a substrate with said illumination beam through said mask, and hold said mask at a position on or near said predetermined plane.

94. An apparatus according to claim 93, wherein said optical device makes the intensity distribution increase in a plurality of areas which are eccentric to said optical axis.

95. An apparatus according to claim 94, wherein said optical device is mounted so as to be able to be inserted into or removed from an optical path of said illumination optical system.

96. An apparatus according to claim 93, wherein said first optical integrator comprises an internal reflection type integrator having an exit plane with a shape substantially equal to said slit area.

97. An apparatus according to claim 96, wherein said optical device is substantially arranged on said pupil plane of said illumination optical system between said first optical integrator and said predetermined plane.

98. An apparatus according to claim 93, wherein said first optical integrator comprises a fly-eye type integrator having a plurality of optical elements each of which has a cross sectional shape substantially equal to said slit area.

99. An apparatus according to claim 98, wherein said optical device is arranged adjacent to said first optical integrator.

100. An apparatus according to claim 93, further comprising:

a second optical integrator different from said first optical integrator, said second optical integrator arranged within said illumination optical system.

101. An apparatus according to claim 100, wherein said second optical integrator comprises one of an internal reflection type integrator and a fly-eye type integrator.

102. An apparatus according to claim 100, wherein one of said first and second optical integrators is an internal reflection type integrator and the other is a fly-eye type integrator.

103. An apparatus according to claim 93, further comprising:

a projection optical system having a pupil plane which substantially conjugates with one of an incident plane and an exit plane of said first optical integrator.

104. An apparatus according to claim 103, further comprising:

another movable member arranged in a position on or near an imaging plane of said projection optical system and movable independently relative to said movable member, said another movable member holding said substrate.